Triodes *Types CAT20 and CAT20C*

(HF AMPLIFIERS AND MODULATORS)

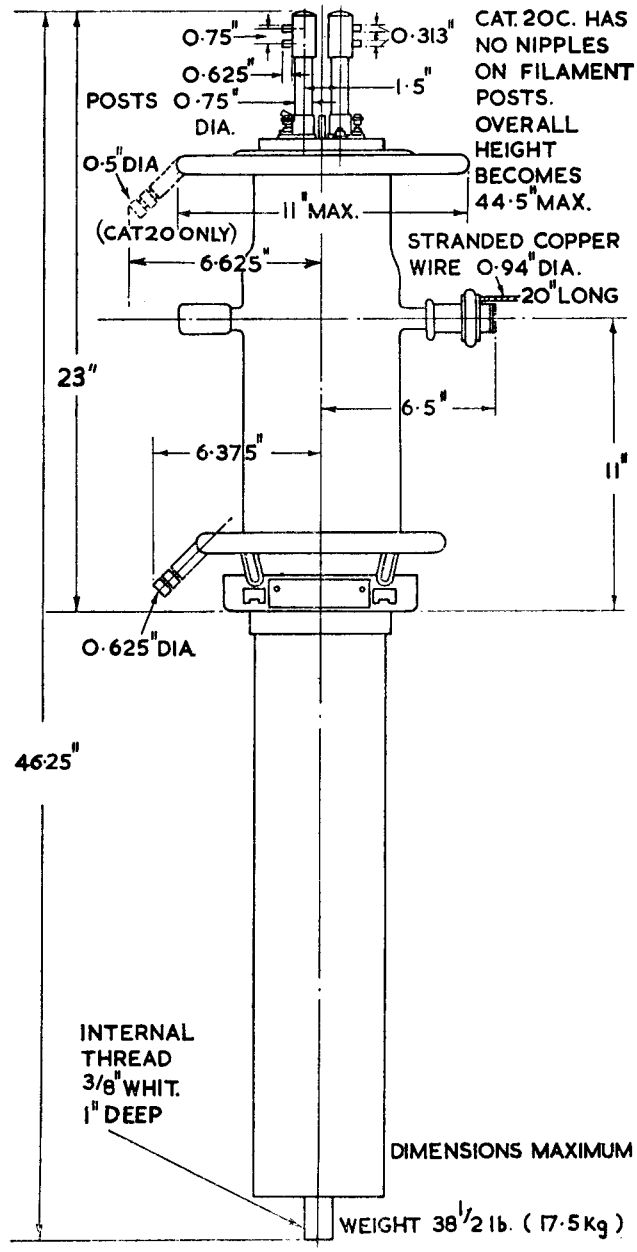
General. Water-cooled transmitting triodes fitted with tungsten filaments, suitable for use as high frequency amplifiers at frequencies up to 20 Mc/s. The valves are particularly suitable for use as a Class B modulator.

The two valves are identical except for filament lead cooling, the CAT 20C having air-cooled leads and the CAT 20 water-cooled leads.

Cooling. The anode forms part of the valve envelope and is designed for cooling by water circulated in direct contact with the anode. The rated flow should not be less than 20 gallons per minute. The temperature of the cooling water at the outlet must not be greater than 150°F (65°C). The water flow to the filament leads should be 400 cc. per minute. The temperature of the lead cooling water must not exceed 122°F (50°C) at the outlet. Air cooling of the anode-glass seal is essential. The cooling ring requires a volume of air of approximately 4 cu. ft. per minute at a pressure equal to 4 in. head of water. All cooling supplies must be started before the application of any supply voltages and must continue for at least 2 minutes after the removal of all supply voltages.

Filament Starting. The cold resistance of the filament is of the order of 0·011 Ω. The filament current must never exceed 225 A at any time during the switching-on period. If the valve is operated for periods greater than 15 minutes without anode voltage being applied, the filament voltage must be reduced to one-half its normal value during the standby period.

HT Switching. It is not permissible to apply directly HT voltage in excess of one-third the maximum rated anode voltage. At higher voltages the HT should either be gradually increased from a low value or three-position switching should be employed.



MARCONI'S WIRELESS TELEGRAPH COMPANY LIMITED

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Mounting. The valve must be completely supported by its water jacket, which should be capable of adjustment so that the axis of the valve is truly vertical. Rigid connections must be made to anode only.

Seasoning. Whenever a new valve is put into service, or when a valve has been idle for periods of approximately 2 months, it must be seasoned by operating for at least one hour at half the normal anode voltage and current. The anode voltage should then be increased slowly to normal value.

APPROXIMATE DATA

$V_{f\ (nom)}$			31·5	V
I_f			230	A
$V_{a\ (max)}$			20	kV
$p_{a\ (max)}$			75	kW
$p_{gl\ (max)}$			3	kW
$I_{gl\ (pk)\ (max)}$			30	A
μ	taken at		35	
r_a	V_a	15 kV	1,450	Ω
g_m	I_a	5 A	24	mA/V
$c_{a\text{-}gl}$			40	pF
$c_{a\text{-}k}$			3	pF
$c_{gl\text{-}k}$			54	pF

Each valve is marked with the filament voltage to give 50 A emission at 90% saturation.

Typical Operation

(1) HF POWER AMPLIFIER AND OSCILLATOR. CLASS C TELEGRAPHY

(*Unmodulated, one valve, key down conditions*)

V_a		20	18	15	12	kV
I_a		11·4	11·4	10·7	10·7	A
V_{gl}		−930	−880	−1,040	−960	V
I_{gl}	(a)	1·85	1·8	1·7	1·7	A
$v_{gl\ (pk)}$		2,730	2,480	2,640	2,560	V
P_{dr}	(a)	5·5	4·6	4·7	4·6	kW
Z_a		740	650	580	420	Ω
p_a		67	64	50	47	kW
P_{out}		161	141	110	81	kW

(2) HF POWER AMPLIFIER. CLASS C

(*Anode modulation, one valve, carrier conditions, permissible modulation 100%*)

V_a		15	12	kV
I_a		4·4	4·5	A
V_{gl}		−1,170	−1,030	V
I_{gl}	(a)	0·6	0·6	A
$v_{gl\ (pk)}$		1,860	1,685	V
P_{dr}	(a)	1·1	1·0	kW
Z_a		1,510	1,140	Ω
p_a		14	15	kW
P_{out}		52	39	kW

(3) HF POWER AMPLIFIER. CLASS B TELEPHONY

(*One valve, carrier conditions, permissible modulation 100%*)

V_a	18	15	kV
I_a	5·3	5·3	A
V_{gl}	−515	−430	V
I_{gl}	895	830	V
P_{dr}	850	840	W
Z_a	780	600	Ω
p_a	68	58	kW
P_{out}	27	21	kW

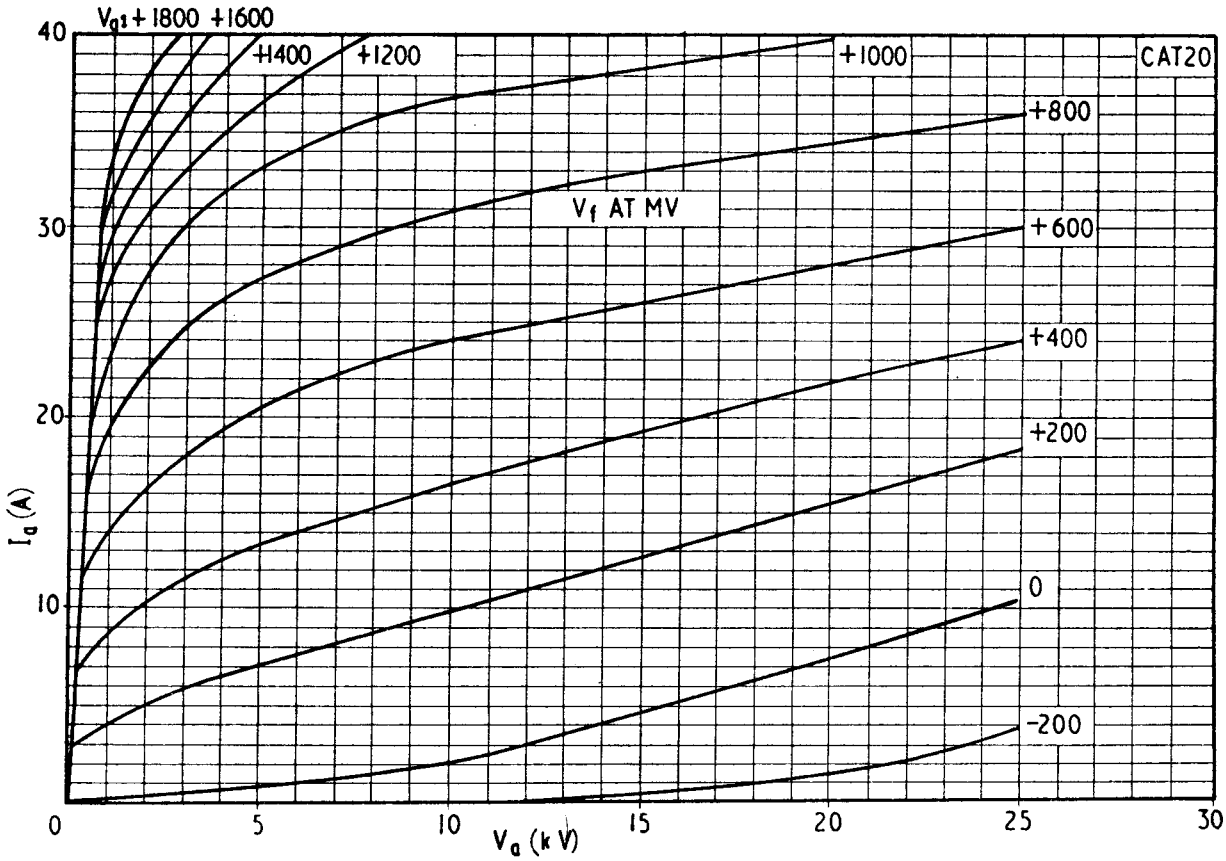
The figures quoted above apply only to operation at frequencies up to 5 Mc/s. At higher frequencies the anode voltage must be reduced according to the following table:

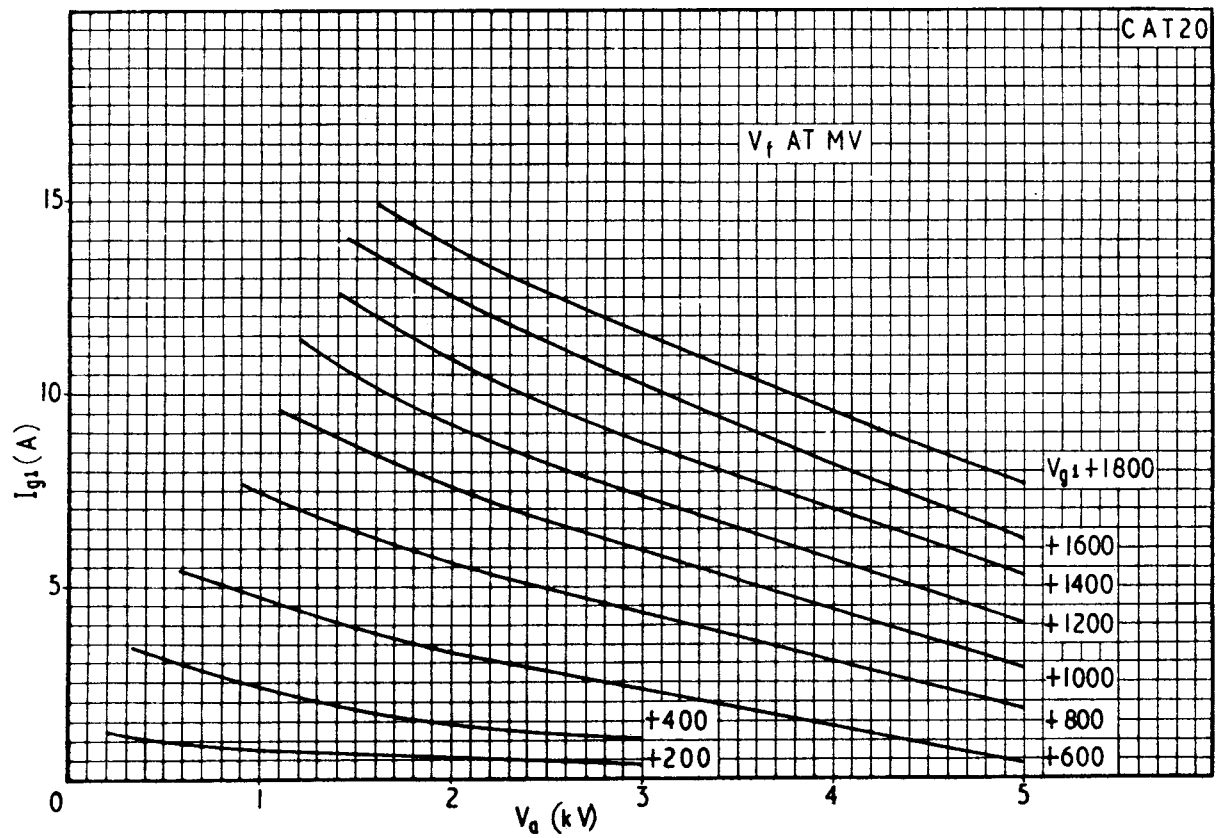
f (Mc/s)	5	10	15	20
% $V_{a(max)}$	100	90	75	50

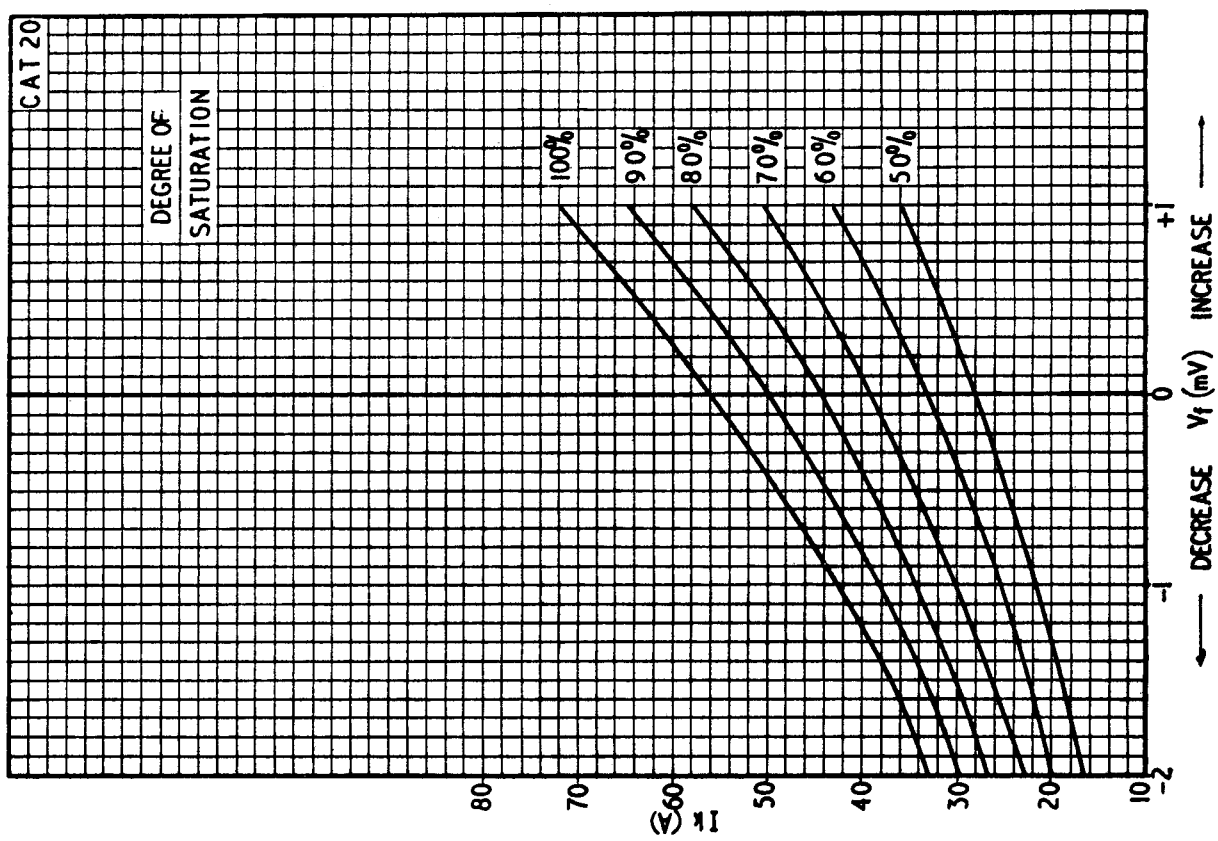
NOTES

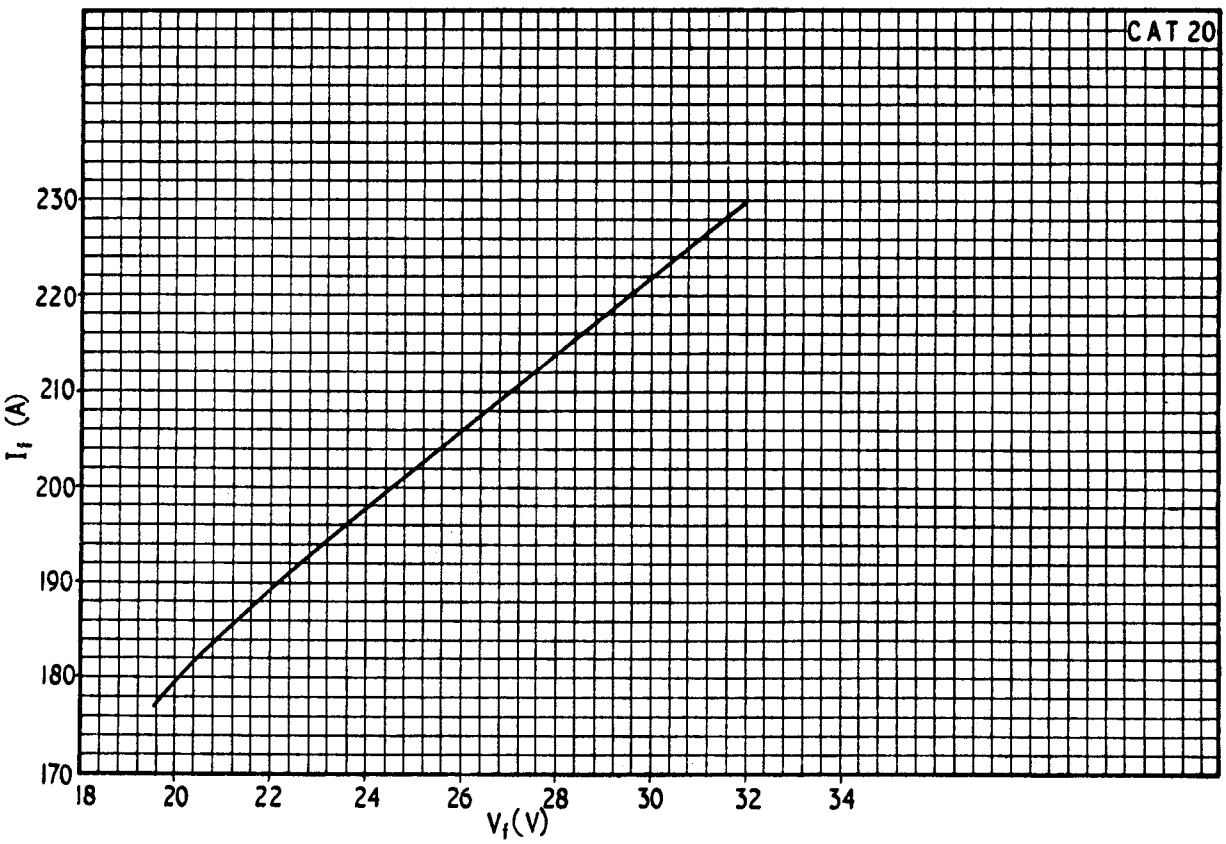
(a) Subject to wide variation. The figures given are approximate only.

(b) At crest of audio cycle with 100% modulation.


CAT20
V_{g1} +1800 +1600
+1400
+1200
+1000
+800
V_f AT MV
+600
+400
+200
0
-200
I_a (A)
V_a (kV)
0
5
10
15
20
25
30
10
20
30
40


CAT20
V_f AT MV
V_{g1} +1800
+1600
+1400
+1200
+1000
+800
+600
+400
+200
I_{g1} (A)
V_a (kV)
0
1
2
3
4
5
5
10
15





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